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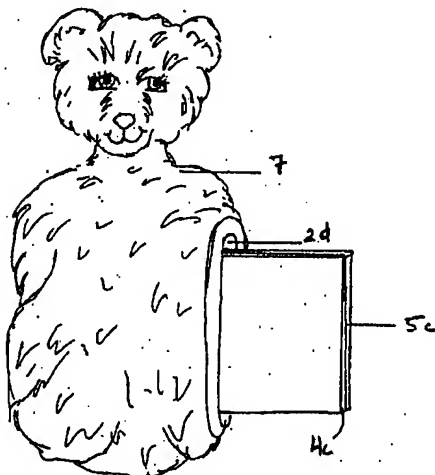
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### (54) Process for refreshing and de-wrinkling fabrics

(57) The present invention provides a process for refreshing and de-wrinkling fabrics in a tumble-dryer. This process includes (a) providing device containing a carrier sheet having a first side and a second side, a fragrance delivery vehicle having up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably af-

fixed to the first side of the carrier sheet, and a liquid delivery vehicle containing an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet; and (b) contacting the device with a fabric in a tumble-dryer at a temperature above about 40°C until the fabric is refreshed and de-wrinkled. The invention further includes devices for carrying out the process.

Figure 4



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## Description

**FIELD OF THE INVENTION**

[0001] The present invention relates to a process for refreshing and de-wrinkling a fabric in a tumble-dryer. More particularly, the process includes providing a fragrance delivery vehicle and an aqueous liquid delivery vehicle, which convey a fragrance and humidity to the fabric to achieve the refreshing and de-wrinkling effect. Devices and compositions used in the refreshing and de-wrinkling process are also provided.

**BACKGROUND OF THE INVENTION**

[0002] As a result of the high cost and environmental considerations of traditional dry cleaning, products designed to "freshen" dry cleanable clothes at home either in a washing process or in a drying process have been developed. For example, Siklosi, *et al.*, U.S. Patent. No. 5,547,476 discloses a home dry cleaning process. In this process, a carrier sheet releasably impregnated with a solvent (e.g., butoxy propoxy propanol), a wetting agent (e.g., 1,2-octanediol), water, and an emulsifier is placed in a plastic bag with soiled garments and tumbled in a hot air clothes dryer.

[0003] The use of sponges in conjunction with clothing treatment processes is also known. For example, Nayar, U. S. Patent. No. 4,824,582 ("Nayar '582") discloses dryer-added fabric conditioning articles, such as sponges, which utilize alkyl amine-anionic surfactant ion-pair complexes as fabric conditioning agents. It is suggested in Nayar '582 that the recited compositions may contain polymeric soil release agents and fabric softeners. Nayar '582 also discloses a process wherein damp fabrics are commingled with a conditioner active and other optional components, e.g., fragrances, in an automatic laundry dryer to provide the fabric with a soft, antistatic finish concurrently with the drying operation. Nayar '582 also discloses that the fabric conditioning agents are preferably employed in combination with a dispensing means adapted for use in an automatic dryer.

[0004] Refreshing clothing using fragrances in conjunction with conventional clothes dryers is a well-recognized problem because the heat generated by such dryers may degrade or destroy the fragrance. A number of patents attempt to address this problem. For example, U.S. Patent Nos. 5,094,761, 5,102,564, and 5,234,610 all to Banks, *et al.* disclose the use of an effective amount of a perfume/cyclodextrin complex to apply a fragrance to a fabric in an automatic laundry dryer.

[0005] Alternatively, Davis, *et al.*, U.S. Patent No. 5,681,355 ("Davis '355") discloses a dry cleaning process for a hot air clothes dryer using a containment bag. In Davis '355, the bag is constructed using heat resistant polymers such as nylon to avoid unanticipated hot spots in the dryer. In this process, the bag retains its integrity and may be reused in subsequent dry cleaning operations.

[0006] Processes for de-wrinkling, refreshing, and/or aromatization of fabrics without heat are also known. See e.g., Lindauer, *et al.*, U.S. Patent Nos. 6,033,729, 6,034,051, and 6,045,861. For example, Lindauer, *et al.*, U.S. Patent Nos. 6,034,051 ("Lindauer '051") discloses a three-dimensional expandable hydrophilic sponge containing in its interstices, a fragrance composition. Before use in a process for refreshing and de-wrinkling clothes, water is added to the anhydrous hydrophilic sponge in a weight ratio of water to sponge from 1:5 to 5:1. The hydrated sponge is placed, with clothes to be refreshed, in a tumbler-dryer run on the "fluff" (no heat) cycle setting (*i.e.*, at 20°C to 30°C).

[0007] The above-referenced sponge overcomes some of the disadvantages of the earlier art, however, it does not completely satisfy consumer needs. For example, the Lindauer '051 patent requires low operating temperatures that are insufficient to de-wrinkle certain fabrics commonly used in consumer-operated tumble-dryers. In addition, the low operating temperature required by the Lindauer '051 process also impairs the delivery of high boiling point perfumes, which limits the perfumer's options for creating long-lasting fresh perfumes.

[0008] In the system described above, once the sponge is exhausted of its fragrance composition, it should be discharged. Consumers, however, may be tempted to "regenerate" the sponge by adding fragrance compositions or other fragrant compositions to it, which may not be suitable for fabric refreshing. Moreover, another disadvantage of the sponge recited in Lindauer '051 is that to regenerate it, the consumer must "dip" it into a source for regeneration (*i.e.*, fragrance and water plus optional actives), thus exposing his or her hands to the chemicals in the regeneration media.

**SUMMARY OF THE INVENTION**

[0009] A need exists for a process to refresh and de-wrinkle a fabric that may be carried out at elevated temperatures found in typical consumer tumble-dryers. Ideally, the process should include a device that is easily used by the consumer, and a composition that may be regenerated simply without exposing the consumer to contact with laundry chemicals. The present invention is directed to meeting these and other needs.

[0010] One embodiment of the invention is a process for refreshing and de-wrinkling fabrics in a tumble-dryer. This process includes (a) providing a device containing a carrier sheet having a first side and a second side, a fragrance

delivery vehicle having up to 50% of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably affixed to the first side of the carrier sheet, and a liquid delivery vehicle containing an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet; and (b) contacting the device with a fabric in a tumble-dryer at a temperature above about 40°C until the fabric is refreshed and de-wrinkled.

[0011] The present invention provides another process for refreshing and de-wrinkling a fabric in a tumble-dryer. This process includes providing a device for delivering fragrance and humidity to a fabric. The device includes a carrier sheet having a first side and a second side, a fragrance delivery vehicle having up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is removably affixed to the first side of the carrier sheet, and a liquid delivery vehicle that has an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet. The absorbent material is then hydrated with the aqueous liquid and the device is contacted with a fabric in a tumble-dryer at a temperature above about 40°C.

[0012] Another embodiment of the present invention is a device for refreshing and de-wrinkling a fabric in a tumble dryer. The device includes a fragrance delivery vehicle containing a polymer, a low melting point wax or an absorbent woven or non-woven fabric and up to 50%(wt) of a fragrance composition disposed within the polymer, low melting point wax or absorbent woven or non-woven fabric and a liquid delivery vehicle that has an absorbent material. At temperatures above about 40°C, the fragrance delivery vehicle delivers fragrance and the liquid delivery vehicle, when hydrated prior to use, delivers humidity to refresh and de-wrinkle the fabric.

[0013] The present invention also provides another a device for refreshing and de-wrinkling a fabric. This device includes a fragrance delivery vehicle having up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably affixed to one side of a carrier sheet. The device also contains a liquid delivery vehicle including an aqueous liquid absorbed onto an absorbent material, which liquid delivery vehicle is affixed to the opposite side of the carrier sheet. In this device, the fragrance and liquid delivery vehicles release fragrance and humidity generated from the fragrance composition and aqueous liquid, respectively, when heated above 40°C to refresh and de-wrinkle the fabric.

[0014] Another embodiment of the invention is a device for refreshing and de-wrinkling fabrics. This device includes a carrier sheet having a first side and a second side, a fragrance delivery vehicle having up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably affixed to the first side of the carrier sheet, and a liquid delivery vehicle that has an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet.

#### **BRIEF DESCRIPTION OF THE FIGURES**

[0015] FIG. 1a is an illustration of a device according to the present invention.

[0016] FIG. 1b is an illustration of an alternative embodiment of FIG. 1a.

[0017] FIG. 2a is a side view of an alternative embodiment of the device of FIG. 1a.

[0018] FIG. 2b is a top view of the device of FIG. 2a.

[0019] FIG. 3a is a side view of an alternative embodiment of FIG. 1a.

[0020] FIG. 3b is a top view of the device of FIG. 3a.

[0021] FIG. 3c is a top view of FIG. 3a with insert.

[0022] FIG. 4 is an alternative embodiment of FIG. 1a.

[0023] FIG. 5a is an alternative embodiment of FIG. 1a.

[0024] FIG. 5b depicts the device of FIG. 5a with a carrier insert.

[0025] FIG. 6a depicts an alternative embodiment of FIG. 1a.

[0026] FIG. 6b depicts the device of FIG. 6a containing fragrance pellets.

#### **DETAILED DESCRIPTION OF THE INVENTION**

[0027] One embodiment of the invention is a process for refreshing and de-wrinkling fabrics in a tumble dryer. This process includes providing a device that has an optional carrier having a first side and a second side. The device also contains a fragrance delivery vehicle having up to 50%(wt) of a fragrance composition disposed within a substrate, such as for example, a polymer, a low melting point wax, or an absorbent woven or non-woven fabric or an absorbent woven or non-woven fabric detachably affixed to the first side of the carrier sheet. A liquid delivery vehicle containing an absorbent material is affixed to the second side of the carrier sheet. The device is then contacted with a fabric in a tumble dryer at a temperature above about 40°C until the fabric is refreshed and de-wrinkled.

[0028] In the present process, the fragrance and liquid delivery vehicles may be directly attached to each other, in which case the carrier sheet is omitted; or they may be attached indirectly to each other through a carrier or support.

Thus, the respective vehicles may be directly laminated or adhered to each other, or may be laminated or adhered to opposite sides of, e.g., a carrier sheet.

**[0029]** The optional carrier sheet to which the fragrance and liquid delivery vehicles are affixed may take any convenient form and may be made from any dryer-safe material.

**[0030]** As used herein, the term "de-wrinkling" and "wrinkle abatement" are used interchangeably and refer to the ability of the present process, compositions, and devices to remove wrinkles from a fabric. Example 1 below defines a protocol for quantitating adequate de-wrinkling. In the present invention, a score of "5" in the wrinkle abatement test is considered de-wrinkled, preferably the score is above 8.

**[0031]** As used herein, the term "refreshing" refers to the ability of a fragrance composition to impart a fragrance to a fabric. Example 2 below defines a protocol for quantitating adequate refreshing. In the present invention, a score of "3", preferably "2" is considered refreshed.

**[0032]** In the present invention, the term "fabric" means articles of clothing or other household materials (sheets, towel, blankets, etc.) that are typically dried in tumble-dryers. For purposes of the present invention, "fabric" includes synthetic, natural, and blended articles. For example, a fabric may include materials made from cotton, linen, polyester, rayon, and blends thereof.

**[0033]** As used herein, the term "tumble-dryer" refers to commercially available drying machines used by a consumer to dry clothing, such as for example, a General Electric Front Loader Dryer Model No. DDP1380GFMWH. Such dryers may be either electric- or gas-powered, and are well known in the art.

**[0034]** In the present invention, a fragrance delivery vehicle is used to apply the fragrance composition to the fabric. In the present invention, the fragrance delivery vehicle includes a polymer, a low melting point wax, or an absorbent woven or non-woven fabric each of which must be capable of absorbing up to 50%(wt) of the fragrance composition alone or in combination with other auxiliary agents.

**[0035]** Any commercially available polymer may be used in the fragrance delivery vehicle of the present invention, so long as the polymer is capable of absorbing a minimum of 10%(wt), preferably 20%(wt) of the fragrance composition and any optional additives. In the present invention, the polymer may be, for example, polyethylene, low density polyethylene (Dow AFFINITY; Union Carbide FLEXOMER), polypropylene, polyolefin, polyurethane, ethyl vinyl acetate (Du Pont ELVAX), polyvinyl chloride (BF Goodrich GEON), co-polymers which may contain additives such as a vinyl group to aid their uptake or release of fragrance and combinations of these polymers. Preferably, the fragranced polymer is a low-density polypropylene, which is available from Polyvel Inc., Hammonton, New Jersey, under the tradename MONTELL PROFAX as an extruded sheet, pellet, bead, disk, or capsule.

**[0036]** A low melting point solid, such as a wax, may be used in place of the polymer in the fragrance delivery vehicle. Any commercially available low melting point wax may be used in the fragrance delivery device, so long as the wax is capable of absorbing up to a minimum of 10%(wt), preferably 20%(wt) of the fragrance composition and any optional auxiliary agent.

**[0037]** For purposes of the present invention, a wax has a suitable melting point, if its melting point is below 75°C, preferably below 65°C. In the present invention, the low melting point wax may be, for example, alkyl methicone AMS-C30 (Dow Corning), natural candelilla (Candelilla Frank B. Ross), stearyoxytrimethylsilane 580 wax (Dow Corning), cetyl palmitate DUB PC Stearine (Dubois), microcrystalline/petrolatum Multiwax B710 (Witco), Scale paraffin (Strahl and Pitsch), Natural Beeswax (Frank B. Ross), microcrystalline (Ultraflex Petrolite), microcrystalline Ross wax 1329/1 (Frank B. Ross), microcrystalline Multiwax 110X (Witco), paraffin (Altafin 135/140), petrolatum (Petrolatum snow Penreco), refined paraffin (Strahl and Pitsch), and paraffin Altafin 125/130. Preferably, the low melting point wax is selected from microcrystalline Multiwax W145A (Witco), paraffin (Altafin 140/145 Astor-Durachem), and microcrystalline Ross wax 1365 (Frank B. Ross).

**[0038]** In the present invention, a fragrance composition is absorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric. The selection of the fragrance composition is not critical to the present invention, so long as it is capable of imparting a pleasing fragrance to a fabric when subjected to heat in a tumble-dryer. The fragrance composition may be a perfume oil consisting of a mixture of one or more of the following classes of compounds: alcohols, aldehydes, ketones, esters, acetals, oximes, nitriles, ethers and essential oils. Preferably, the fragrance composition contains at least 80% of an aroma chemical with a vapor pressure at 25°C below 5000 micrograms per liter, preferably below 2000 micrograms per liter. Preferably, the aroma chemical will have a low perception threshold.

**[0039]** One or more optional auxiliary agents may also be absorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric. As used herein, an "auxiliary agent" is any composition, which imparts a benefit to the fabric to be refreshed and de-wrinkled, and which is able to be absorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric. Such auxiliary agents may include, for example, antimicrobial agents, cationic agents, antistatic agents, dyes, nonionics, fatty acids, oils, emulsifiers, shape retention agents, anti wrinkling agents, color care agents, bluing agents, optical brighteners, preservatives, enzymes, emulsifiers, antioxidants anti-corrosion agents, insect repellent agents, and mixtures thereof.

[0040] In the present invention, antimicrobial agents may include, for example, salts such as zinc citrate, zinc oxide, zinc pyrethiones, octopinox; organic acids such as sorbic acid, benzoic acid, and their salts; parabens such as methyl paraben, propyl paraben, butyl paraben, ethyl paraben, isopropyl paraben, isobutyl paraben, benzyl paraben, and their salts; alcohols such as benzyl alcohol, phenyl ethyl alcohol; boric acid; 2,4,4'-trichloro-2-hydroxy-diphenyl ether; phenolic compounds, phenol, 2-methyl phenol, 4-ethyl phenol; essential oils such as rosemary, thyme, lavender, eugenol, geranium, tea tree, clove, lemon grass, peppermint, or their active components such as anethole, thymol, eucalyptol, farnesol, menthol, limonene, methyl salicylate, salicylic acid, terpineol, nerolidol, geraniol, and mixtures thereof.

[0041] The cationic agents of the present invention may include, for example, dialkyl dimethyl ammonium chloride, dialkyl dimethyl ammonium methyl sulphate, dialkylalkoxy dimethyl ammonium chloride, dialkyl imidazolium methyl sulphate, ester quats, amido silicones, and mixtures thereof. An example of a quat that is useful in the present invention is Varisof 950 (available from Goldschmidt).

[0042] The antistatic agents of the present invention may include, for example, cationic, anionic, nonionic agents, and mixtures thereof. The cationic agents may be monoalkyl quaternary ammonium compounds *e.g.* monolauryl trimethyl ammonium chloride, hydroxycetyl hydroxylethyl dimethyl ammonium chloride, triethonium hydrolyzed collagen ether sulphate, ethyl bis (polyethoxy ethanol) alkyl ammonium ether sulphate, polymeric quaternary ammonium salts, vinylpyrrolidone/metacrylamidopropyltrimethylammonium chloride copolymer, quaternized polyethyleneimines, and mixtures thereof. The antistatic agents of the present invention may include anionic antistatic agents, such as for example, neutralized sulphonated polystyrene, neutralized sulphonated styrene/maleic anhydride copolymers, and mixtures thereof. The antistatic agents of the present invention also include nonionic agents, such as polyethoxylated polymers, such as polyethylene glycol.

[0043] The antiwrinkling agents of the present invention may be natural or synthetic polymers. These polymers may be, for example, cationic polyglycolethers, silicon microemulsions, polyether-modified polysiloxanes, quaterinized polymethylsiloxanes, polycarboxylic acids, polyvinylpyrrolidone/dimethylaminoethyl methacrylate copolymers, and mixtures thereof.

[0044] In the present invention, it is preferred that about 10%(wt) to about 50%(wt) of the fragrance composition be adsorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric (*e.g.*, in a multi-use fragrance delivery vehicle). Preferably, greater than 20%(wt) of the fragrance composition is absorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric. The total amount of the auxiliary agent(s) absorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric must not exceed about 10%(wt), preferably not more than 5%(wt).

[0045] Alternatively, it is also preferred that about 2.5%(wt), such as for example, about 10%(wt), of the fragrance composition be adsorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric (*e.g.*, in a single, re-useable fragrance delivery vehicle).

[0046] In this process, a liquid delivery vehicle is either permanently or detachably affixed to the carrier on the side opposite to the fragrance delivery vehicle. The liquid delivery vehicle includes an absorbent material that is capable of absorbing an aqueous liquid. In the present invention, the liquid delivery vehicle may be the absorbent material itself, or it may include the absorbent material affixed to a carrier, as set forth in more detail below.

[0047] As used herein, "absorbent material" means any material that may absorb an aqueous liquid in sufficient quantities to provide the interior of the tumble-dryer with humidity when heated, and achieve an effective de-wrinkling of the fabric contained therein. For example, an absorbent material that may be used in the present invention includes natural sponges, synthetic sponges such as those made from cellulose derivatives including viscose, cellulosic derivatives such as cellulose acetate, cellulose butyrate, cellulose propionate, absorbent fabrics/textiles such as Terry towel, absorbent polymers, and woven or non-woven adsorbent natural and synthetic substrates. In the present invention, a preferred absorbent material must be able to retain its integrity for at least ten uses in a standard consumer tumble dryer and absorb greater than five times its weight of water.

[0048] Any tumble-dryer- and fabric-safe aqueous-based liquid may be applied to the absorbent material. Preferably, however, the aqueous liquid is water.

[0049] In this process, when the temperature inside of the tumble-dryer is raised as set forth below, the aqueous liquid in the absorbent material is volatilized to provide humidity that de-wrinkles the fabric. The amount of the aqueous liquid required to be absorbed into the absorbent material will vary depending upon a number of variables, including for example, the surface area of the absorbent material, its absorbance capacity, the amount of fabric to be de-wrinkled, etc. Preferably, the amount of the aqueous liquid to be used is at least about 10 gm/kg to about 50 gm/kg of fabric to be de-wrinkled, such as for example about 15 gm/kg of fabric.

[0050] In the present invention, the fragrance and liquid delivery vehicles are contacted with the fabric in the tumble-dryer at a temperature above about 40°C. Preferably, the temperature is not greater than about 80°C, such as between 50°C to 70°C, which is typical of most home tumble-dryers. The temperature selected will, of course, depend upon the type of fabric being treated.

**[0051]** In the present invention fabric is contacted inside the tumble dryer with the fragrance and liquid delivery vehicles at a temperature set forth above for a time sufficient to refresh and de-wrinkle the fabric. The exact time required for such refreshing and de-wrinkling to occur will, of course, vary depending upon the heat setting, the amount of fabric in the dryer, and other well known variables. The time required to refresh and de-wrinkle the fabric may range from about 15 minutes to about 90 minutes, preferably from about 30 to about 45 minutes.

**[0052]** The fragrance delivery vehicle may be designed in any convenient shape, so long as the fragrance composition is releasable into the tumble-dryer and is available to adequately refresh the fabric. Thus, the fragrance delivery vehicle may be a sheet, a pellet, a bead, disk, or a capsule. Preferably, the fragrance delivery vehicle is in the form of a sheet or a bead.

**[0053]** Turning now to Figures 1a and 1b, preferably, the fragrance delivery vehicle (10a, 10b) is detachably affixed to one side (24a, 24b) of a carrier sheet (20a, 20b) and the liquid delivery vehicle (30a) is affixed, either permanently (FIG. 1a), or detachably (FIG. 1b) to the opposite side (22b) of the carrier sheet. In both these configurations, once the fragrance composition is depleted from the polymer, low melting point wax, or absorbent woven or non-woven fabric, the fragrance delivery vehicle is detached from the carrier sheet as shown in FIGS. 1a and 1b and replaced with a new fragrance delivery vehicle having up to 50%(wt) of a fragrance composition and optional auxiliary agents absorbed onto a polymer or low melting point wax. The liquid delivery vehicle is similarly easily regenerated by rehydrating it, e.g., by contacting it with an aqueous liquid, such as water. Thus, the present process provides a quick, simple, mess-free procedure for replacing and/or regenerating both the fragrance and liquid delivery vehicles.

**[0054]** In another embodiment of the invention as shown in FIGS. 2a and 2b, the fragrance delivery vehicle (4a) and sponge (1a, 1b) are disposed within a housing (2a, 2b). The housing may be designed in any convenient shape such as, for example, a semi-rigid case, but it must accommodate both the fragrance delivery vehicle and the sponge. The outer walls of the housing must be thermostable to at least about 90°C, and be able to accommodate, i.e., be permeable to both the fragrance and the volatilized liquid (i.e., humidity) generated by the fragrance composition and the aqueous liquid contained within the respective vehicles. In this manner, the fragrance and volatilized liquid will be transferred to the fabric to effect refreshing and de-wrinkling.

**[0055]** Thus, one or both of the side walls (6a, 6b) of the housing may be substantially open to allow for the fragrance and humidity to pass through the device to the fabric in the dryer. The size, configuration, and dimensions of the openings in the side walls is not critical to the present invention so long as the fragrance delivery vehicle and the liquid delivery vehicle are maintained within the housing and the fragrance and humidity produced upon heating are able to be dispersed within the tumble dryer to refresh and de-wrinkle fabrics contained therein. Thus, the openings in the side walls may be slotted or covered by a membrane permeable to the fragrance and humidity, etc.

**[0056]** A space (3a) is provided in the housing, which is dimensioned to accommodate a plastic carrier (5a) having disposed on a surface thereof a fragrance delivery vehicle (4a).

**[0057]** The housing, as noted above, may be in any convenient shape. For example, it may be rectangular as in FIGS. 2a and 2b or it may be ellipsoidal as in FIGS. 3a-3c. Moreover, as shown in FIG. 3a, a sponge (1c) may be used in place of a semi-rigid housing structure. In this embodiment, the sponge is designed so that it has a hollow cavity or space (2c) of sufficient dimensions to accommodate a plastic insert (5b) on which is disposed the fragrance delivery vehicle (4b). See, Fig. 3c.

**[0058]** The device of the present invention (FIGS. 1-3) may be disposed within an outer permeable housing (7) as shown in Fig. 4. The outer housing may take any convenient form. Preferably, the housing is in the form of child friendly character, such as an animal or cartoon character. The outer housing is made from absorbent material such as, for example, a Terry towel, and may also serve as the liquid delivery vehicle. The outer housing has a space (2d) dimensioned to accommodate a fragrance delivery vehicle (4c) attached to a carrier or insert (5c).

**[0059]** In an alternative embodiment, the liquid delivery vehicle may be a foam pad (100) of any convenient shape. See, Fig. 5a. The foam pad has a shaped cavity (80) carved out of its top (40), bottom (50), or both top and bottom sides. The shaped cavity is dimensioned to accommodate a shaped plastic carrier (110) on which is disposed a fragrance delivery vehicle, which fits within the cavity (80). The plastic carrier is maintained or secured within the shaped cavity by any convenient means or device such as, for example, by means of a holding strap (120) detachably secured to the foam pad using a Velcro closure (60, 70) secured at one or both sides of the shaped cavity. See, FIG. 5b.

**[0060]** In another embodiment of the invention, a cloth glove (130) made from an absorbent material, such as for example a Terry towel, functions as the outer housing. The cloth glove surrounds a piece of shaped polymer, such as for example a piece of shaped foam (140) shaped and dimensioned to fit within the cloth glove. See, FIG. 6a. The foam has a hollow interior space (150) dimensioned to receive a plurality of fragrance pellets (160).

**[0061]** The fragrance pellets are loaded into the interior space and held therein by a flap (170) that is secured to the cloth glove by a Velcro fastener (180). Once the fragrance pellets are spent, they are removed from the interior space by opening the flap. New or regenerated fragrance pellets are introduced within the interior space, covered with the flap, and resecured with the Velcro fastener.

**[0062]** Another embodiment of the invention is a device for refreshing and de-wrinkling a fabric in a tumble dryer.

The device includes a fragrance delivery vehicle, which contains a polymer, low melting point wax, or absorbent woven or non-woven fabric as defined above and up to 50%(wt) of a fragrance composition disposed within the polymer, wax, or absorbent woven or non-woven fabric. The device further includes a liquid delivery vehicle containing an absorbent material. In this device, at temperatures above about 40°C, the fragrance delivery vehicle delivers fragrance and the liquid delivery vehicle, when hydrated, delivers volatilized liquid (*i.e.*, humidity) to the inside of the tumble-dryer to refresh and de-wrinkle a fabric.

[0063] As noted above, the absorbent material in the liquid delivery vehicle is hydrated with an aqueous liquid, preferably water, prior to its use in the tumble-dryer.

[0064] One or more auxiliary agents, as defined above, may also be absorbed into the polymer, low melting point wax, or absorbent woven or non-woven fabric of the fragrance delivery vehicle, so long the total amount of liquid absorbed does not exceed about 50%(wt).

[0065] The fragrance and liquid delivery vehicles may be detachably affixed to a carrier as defined above or they may be directly attached to each other. As used herein, a "carrier" is a thermostable support to which the fragrance delivery vehicle may be detachably affixed. The carrier preferably is thermostable up to at least about 90°C, preferably up to at least about 50°C to about 60°C. The fragrance composition, polymer, low melting point wax, or absorbent woven or non-woven fabric used in the composition are defined as set forth above.

[0066] The device containing both the fragrance and liquid delivery vehicles and the optional carrier may be placed in the tumble dryer or inserted into an outer housing, such as in Figure 4.

[0067] A preferred device for refreshing and de-wrinkling a fabric includes a fragrance delivery vehicle as defined above which contains up to about 50%(wt) of a fragrance composition and optional auxiliary agents disposed within a polymer, low melting point wax, or absorbent woven or non-woven fabric. The fragrance delivery vehicle is detachably affixed to one side of a carrier sheet. A liquid delivery vehicle, as defined above, and containing an aqueous liquid absorbed onto an absorbent material is affixed to the opposite side of the carrier sheet. In this device, the fragrance and liquid delivery vehicles release fragrance and humidity, respectively, when heated above 40°C.

[0068] The present invention also provides a device for refreshing and de-wrinkling fabrics in a tumble dryer. The device includes a carrier sheet, as defined above, having a first side and a second side. The device also includes a fragrance delivery vehicle that contains a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric. The fragrance delivery vehicle is detachably affixed to the first side of the carrier sheet. A liquid delivery vehicle, which includes an absorbent material, as defined above, is affixed to the second side of the carrier sheet. In this device, the liquid delivery vehicle may be either permanently or detachably affixed to the second side of the carrier sheet.

[0069] The fragrance delivery vehicle is permanently affixed to the first side of the carrier sheet by any convenient means, including for example, lamination, glue, adherence, etc. The fragrance delivery vehicle may also be detachably affixed to the carrier. This non-permanent affixing system consists of the liquid delivery vehicle having a container permanently attached by lamination or gluing or by an outer housing. The container must be made from a material that is thermostable to at least about 90°C. The walls of the container and housing unit, where appropriate, must be sufficiently porous to allow diffusion of the fragrance. The housing unit may consist of a suitably designed outer membrane that allows the fragrance delivery vehicle to be added and the liquid delivery vehicle to be wet by contacting with a liquid, preferably water. See, Fig. 1.

[0070] This device may be designed for single use, multiple uses, or may be regenerated by replacing the fragrance delivery vehicle when the fragrance composition is depleted and by rehydrating the absorbent material in the liquid delivery vehicle.

[0071] The present invention includes another process for refreshing and de-wrinkling a fabric in a tumble-dryer. This process includes providing a device for delivering fragrance and aqueous liquid to a fabric as defined above. The absorbent material in the liquid delivery vehicle is then hydrated with an aqueous liquid. The device is then contacted with a fabric in the tumble-dryer at a temperature above about 40°C for a time sufficient to effectively refresh and de-wrinkle the fabric, as defined above.

[0072] In this process, the device may be reused indefinitely by replacing the fragrance delivery vehicle once the fragrance composition therein is depleted. This is accomplished by detaching the spent fragrance delivery vehicle from the carrier sheet and attaching a new fragrance delivery vehicle containing a polymer, low melting point wax, or absorbent woven or non-woven fabric containing up to 50%(wt) of a fragrance composition and one or more optional auxiliary agents, as defined above. The liquid delivery vehicle is recharged by simply rehydrating the absorbent material by, for example, submerging the device, prior to reattachment of the new fragrance delivery vehicle, in water for a time period sufficient to completely hydrate the absorbent material.

[0073] In the present invention, a single fragrance delivery vehicle may be engineered for multiple uses, such as for example, up to ten uses before having to be replaced.

[0074] The following examples are provided to further illustrate compositions, devices, and processes of the present invention. These examples are illustrative only and are not intended to limit the scope of the invention in any way.

**EXAMPLES****Example 1****Wrinkle Abatement**

[0075] Fabric bolts of cotton, polyester, and rayon, respectively were cut into 8 x 18-inch rectangles (8 rectangles of each fabric) and formed into bundles that were secured with rubber bands. The bundles were maintained in this fashion for a minimum of 4 hours to ensure thorough wrinkling. Each rectangle of fabric was placed separately into a standard commercially available consumer clothes tumble-dryer (Front Loader Model # DDP1380GFMNH, General Electric Spacemaker) with a liquid delivery vehicle according to the present invention (as described in Fig. 1a) containing a predetermined amount of water in the liquid delivery vehicle ranging from 0gm - 40gm. The tumble-dryer was run for 30 minutes during which the average temperature was between 50°C-60°C. Thereafter, the degree of wrinkling was determined by a 15-member panel based on a scale of 0-10, with 0 being no benefit and 10 being wrinkle-free. The results of this test are presented below in Table 1.

Table 1

Wrinkle Removal				
Amount of Water (gm)	Cotton	Polyester	Rayon	Cotton/Polyester Blend (65%/35%)
0	0	2	2	2
5	0	3	3	2
10	0	5	5	4
15	2	6	6	5
20	3	7	7	6
25	4	8	8	7
30	4	8	8	7
40	4	8	8	7

[0076] Fabrics given a wrinkle abatement score of "5" were determined to be sufficiently de-wrinkled for purposes of the present invention. Thus, under these conditions the liquid delivery vehicle must be loaded with at least 1 gm/14.4 in.<sup>2</sup> of fabric.

[0077] The results in Table 1 indicate that 100% cotton fabrics may require higher temperatures to be effectively de-wrinkled. Fabrics made from synthetic fibers and natural/synthetic blends (such as cotton/polyester blends), however, are adequately de-wrinkled using the liquid delivery vehicle of the present invention.

**Example 2****Fabric Refreshment**

[0078] This experiment was performed to measure the fabric refreshing character of a device according to the present invention on three types of fabric; cotton, polyester, and rayon.

[0079] Fabric bolts of cotton, polyester, rayon and a cotton/polyester blend (65%/35%) were cut to 8x18 inch rectangles samples. Two fabric samples from each type of fabric were suspended in an enclosed odor booth and exposed to the smoke from two lit cigarettes. In addition, smoke was occasionally blown about the fabrics. Each fabric was kept in the booth for 10 additional minutes after the spent cigarettes were removed.

[0080] One set of fabrics (two pieces) were wrapped in foil and kept as the odor control. One set of fabrics was placed into the dryer (Front Loader Model # DDP1380GFMNH, General Electric Spacemaker) for 30 minutes with only a fragranced polymer disk containing 18% of a fragrance composition, 7% of an antistat (POMOSTAT 953 from Piedmont Chemical), and 75% of a low density polypropylene. Another set of fabrics was placed into the dryer for 30 minutes on the "normal/permapress" setting (maximum temperature: 50°C-60°C) with the device according to the present invention (Fig. 1a) containing both a fragrance delivery vehicle (i.e., fragranced polymer disk) and a sponge into which 20 grams of water was placed.

[0081] After 30 minutes in the dryer, the fabrics were placed into aluminum foil and coded. A 15-member panel was

asked to smell the smoke control fabrics first then the coded samples and were asked to rate the intensity of smoke perceived from each fabric sample on a scale of 0-10, with 0 being no smoke detected and 10 being a very high degree of smoke perceived. The control received an average score of 9 for intensity of smoke perceived. All other scores were compared to this score.

Table 2

Fabric Refreshment: Smoke Removal				
Device Type	Cotton	Polyester	Rayon	Cotton/Polyester Blend (65%/35%)
Fragranced Disk	7	5	5	6
Device with 20 g water	3	2	2	2

[0082] The fabric treated with the device according to the present invention containing 20 grams of water ("Device") clearly was perceived as containing significantly less smoke odor than the control. The sample treated with the device of the present invention was also rated as superior in performance compared to the fragranced disk alone ("Fragranced Disk"). Surprisingly, even the cotton performed well when refreshed with the device of the present invention.

[0083] The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention and all such modifications are intended to be included within the scope of the following claims.

### Claims

1. A process for refreshing and de-wrinkling fabrics in a tumble-dryer comprising:

(a) providing device comprising a carrier sheet having a first side and a second side, a fragrance delivery vehicle comprising up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably affixed to the first side of the carrier sheet, and a liquid delivery vehicle comprising an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet; and

(b) contacting the device with a fabric in a tumble-dryer at a temperature above about 40°C until the fabric is refreshed and de-wrinkled.

2. A process according to claim 1 further comprising absorbing onto the absorbent material of the liquid delivery vehicle an aqueous liquid which, when heated, provides a de-wrinkling amount of humidity to the fabric.

3. A process according to claim 2 wherein the aqueous liquid is water.

4. A process according to claim 1 wherein the form of the polymer or low melting point wax of the fragrance delivery vehicle is selected from the group consisting of sheets, pellets, beads, disks, and capsules.

5. A process according to claim 1 wherein the absorbent material of the liquid delivery vehicle is selected from the group consisting of sponges, absorbent fabric, absorbent polymers, non woven or woven natural or synthetic fiber.

6. A process according to claim 1 wherein the fragrance delivery vehicle is laminated or adhered to the liquid delivery vehicle.

7. A process according to claim 1 wherein the fragrance delivery vehicle is detachably affixed to one side of the carrier and the liquid delivery vehicle is affixed to the opposite side of the carrier.

8. A process according to claim 1 wherein the fragrance and liquid delivery vehicles are disposed within a housing having thermostable outer walls which accommodate transfer of fragrance from the fragrance composition and humidity from the aqueous liquid to the fabric when the temperature in the tumble-dryer is raised above 40°C.

9. A process according to claim 7 wherein the fragrance delivery vehicle is replaced after use by detaching it from the carrier and replacing it with a second fragrance delivery vehicle having up to 50%(wt) of a fragrance composition.

sition.

10. A process according to claim 9 wherein the fragrance delivery vehicle contains sufficient fragrance composition to accommodate up to ten drying cycles before requiring replacement.

11. A process according to claim 7 wherein the liquid delivery vehicle is regenerated after use by contacting it with water.

12. A device for refreshing and de-wrinkling a fabric in a tumble dryer comprising:

(a) a fragrance delivery vehicle comprising a polymer, a low melting point wax, or an absorbent woven or non-woven fabric and up to 50%(wt) of a fragrance composition disposed within the polymer, wax, or absorbent fabric; and

(b) a liquid delivery vehicle comprising an absorbent material,

wherein at temperatures above about 40°C the fragrance delivery vehicle delivers fragrance and the liquid delivery vehicle, when hydrated delivers humidity to refresh and de-wrinkle a fabric.

13. A device according to claim 12 wherein the absorbent material is hydrated with an aqueous liquid.

14. A device according to claim 13 wherein the aqueous liquid is water.

15. A device according to claim 12 wherein the fragrance delivery vehicle further comprises an auxiliary agent.

16. A device according to claim 15 wherein the auxiliary agent is selected from the group consisting of antimicrobial agents, cationic agents, antistatic agents, and combinations thereof.

17. A device according to claim 12 wherein the absorbent material is selected from the group consisting of sponges, absorbent polymers, and absorbent textiles.

18. A device according to claim 12 wherein the fragrance delivery vehicle is detachably affixed to a carrier.

19. A device according to claim 18 wherein the carrier is selected from the group consisting of plastic sheets, plastic beads, and absorbent woven or non-woven sheets.

20. A device according to claim 12 wherein the fragrance composition is selected from the group consisting of perfume oils, whose composition has at least 80%(wt) of fragrance materials with a vapor pressure at 25°C below 5000 micrograms per liter.

21. A device according to claim 12 wherein the fragrance delivery vehicle is selected from the group consisting of sheets, pellets, beads, disks, and capsules.

22. A device according to claim 12 wherein the liquid delivery vehicle is a liquid absorbent article dimensioned to secure the fragrance delivery vehicle within an interior space.

23. A device according to claim 12 wherein the liquid delivery vehicle is a liquid absorbent article dimensioned to secure the fragrance delivery vehicle to an outer surface thereof.

24. A device according to claim 20 wherein the fragrance composition has at least 80%(wt) of fragrance materials with a vapor pressure at 25°C below 2000 micrograms per liter.

25. A device according to claim 12 wherein the polymer is selected from the group consisting of polyethylene, polypropylene, polyolefin, polyurethane.

26. A device according to claim 25 wherein the polymer is low density polypropylene.

27. A device according to claim 12 wherein the low melting point wax has a melting point below 75°C, preferably below 65°C.

28. A device according to claim 27 wherein the low melting point wax has a melting point below 65°C.

29. A device for refreshing and de-wrinkling a fabric comprising:

(a) a fragrance delivery vehicle comprising up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably affixed to one side of a carrier sheet; and

(b) a liquid delivery vehicle comprising an aqueous liquid absorbed onto an absorbent material, which liquid delivery vehicle is affixed to the opposite side of the carrier sheet,

wherein the fragrance and liquid delivery vehicles release fragrance and humidity generated from the fragrance composition and aqueous liquid, respectively when heated above 40°C to refresh and de-wrinkle a fabric.

30. A device for refreshing and de-wrinkling fabrics comprising:

(a) a carrier sheet having a first side and a second side;

(b) a fragrance delivery vehicle comprising up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is detachably affixed to the first side of the carrier sheet; and

(c) a liquid delivery vehicle comprising an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet.

31. A device according to claim 30 wherein the fragrance delivery vehicle is detachably laminated or adhered to the carrier sheet.

32. A device according to claim 30 wherein the carrier sheet is a plastic sheet or a non-woven fiber sheet.

33. A process for refreshing and de-wrinkling a fabric in a tumble-dryer comprising:

(a) providing a device for delivering fragrance and humidity to a fabric comprising:

(i) a carrier sheet having a first side and a second side,

(ii) a fragrance delivery vehicle comprising up to 50%(wt) of a fragrance composition disposed within a polymer, a low melting point wax, or an absorbent woven or non-woven fabric which fragrance delivery vehicle is removably affixed to the first side of the carrier sheet, and

(iii) a liquid delivery vehicle comprising an absorbent material, which liquid delivery vehicle is affixed to the second side of the carrier sheet;

(b) hydrating the absorbent material with an aqueous liquid; and

(c) contacting the device with a fabric in a tumble-dryer at a temperature above about 40°C.

34. A process according to claim 33 comprising regenerating the device by replacing the fragrance delivery vehicle, which has been depleted of the fragrance composition, with a second fragrance delivery vehicle containing up to 50%(wt) of a fragrance composition, and rehydrating the absorbent material with an aqueous liquid.

Figure 1a

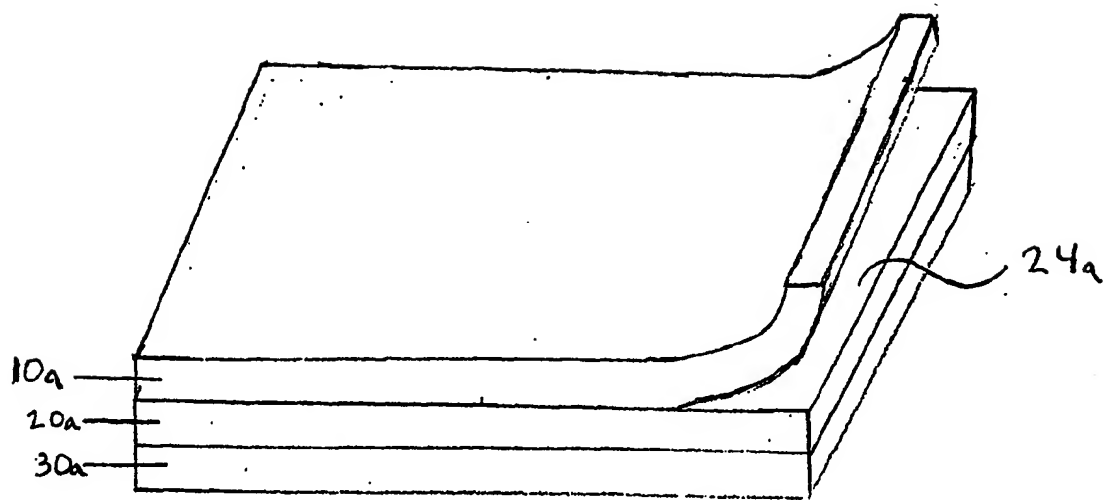


Figure 1b

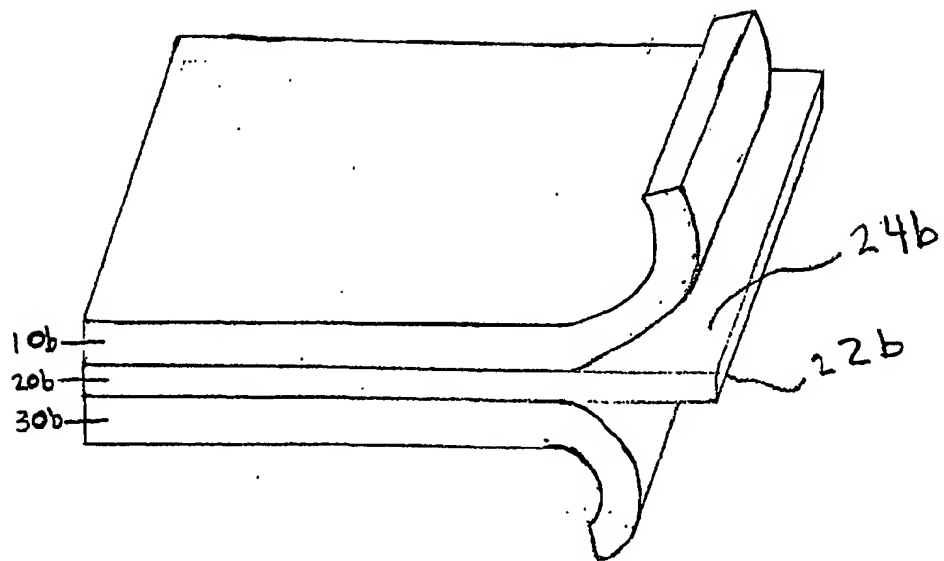


Figure 2a

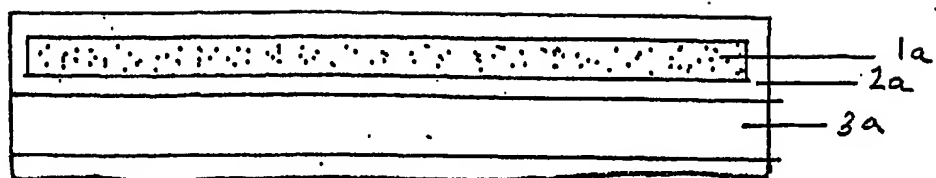


Figure 2b

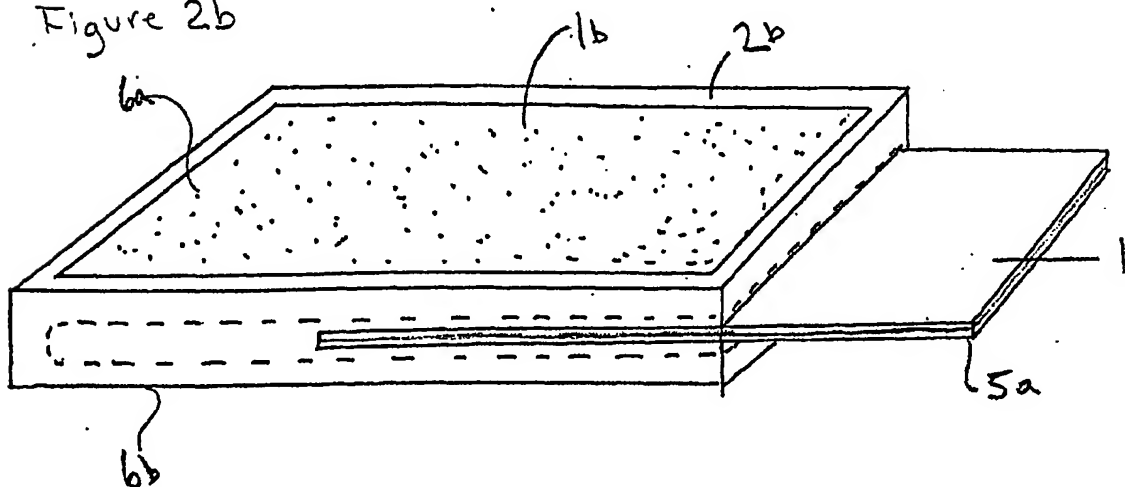


Figure 3a

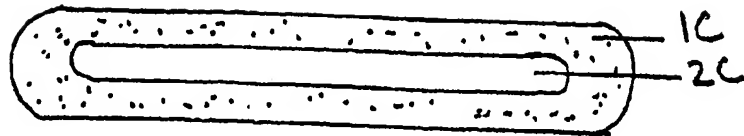


Figure 3b

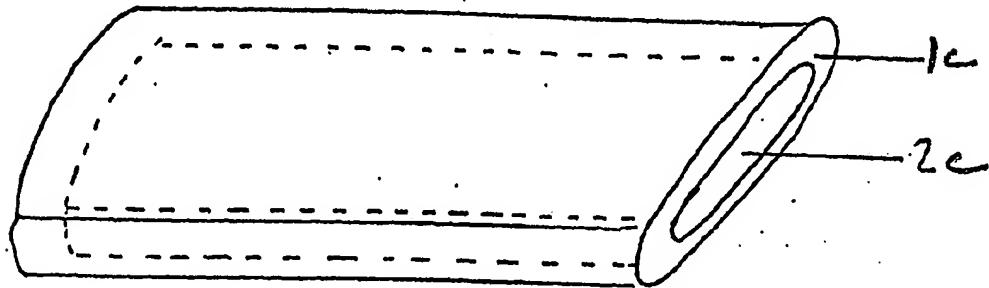


Figure 3c

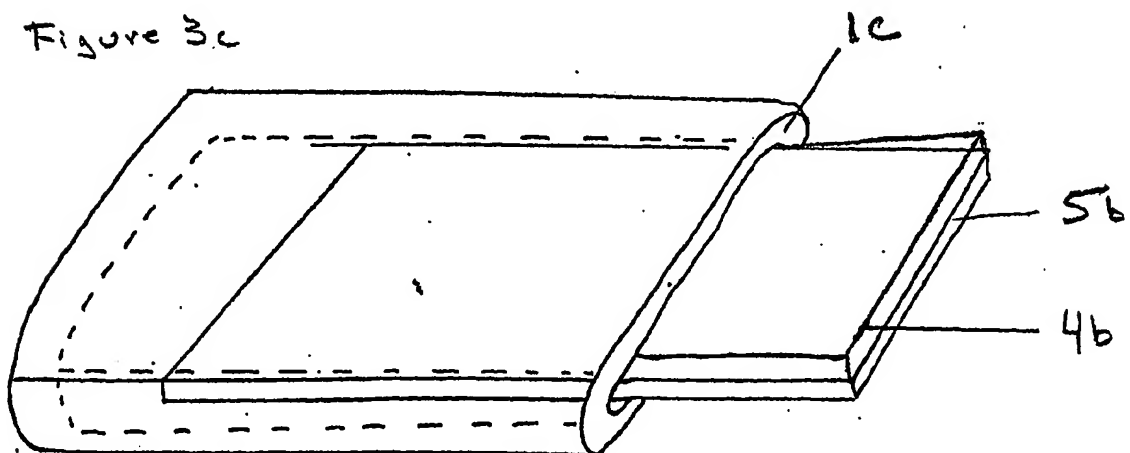


Figure 4

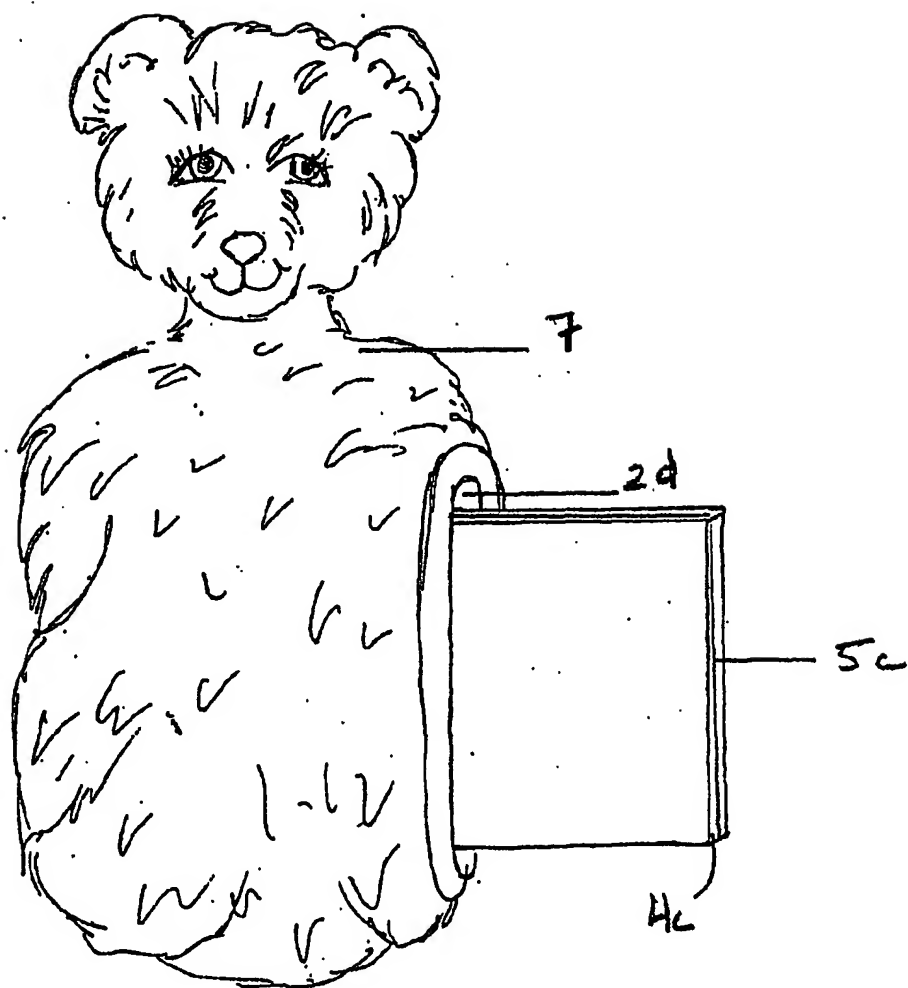


Figure 5a

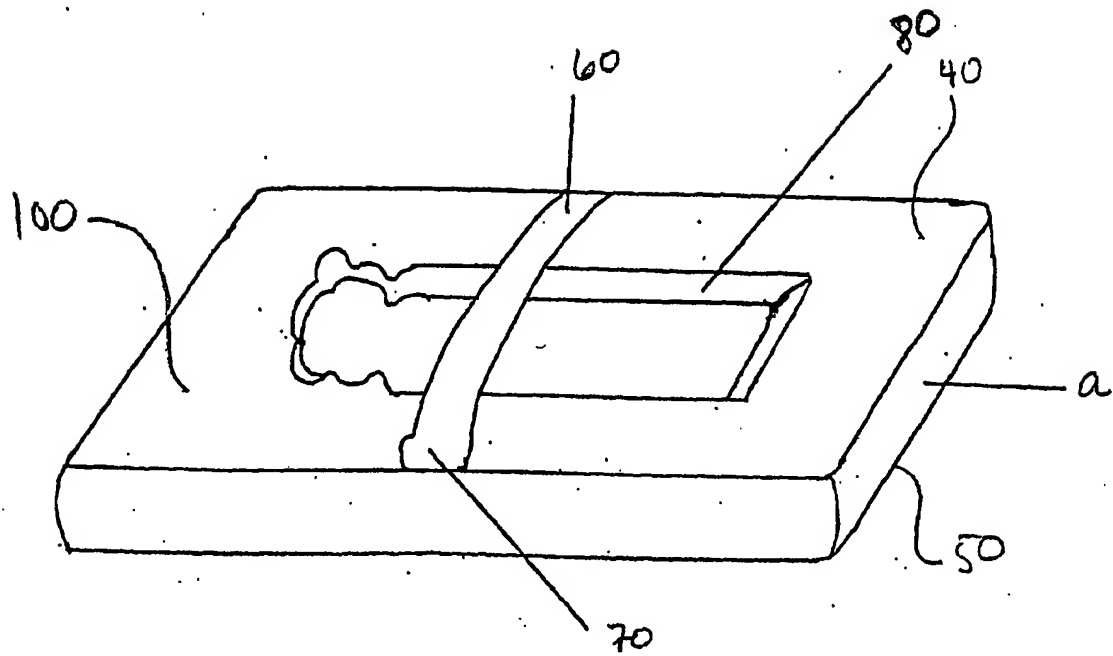


Figure 5b

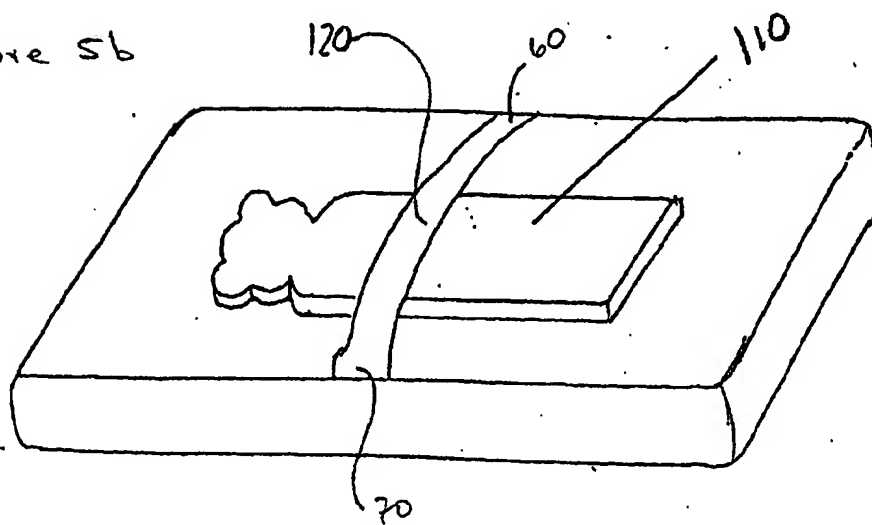


Figure 6a

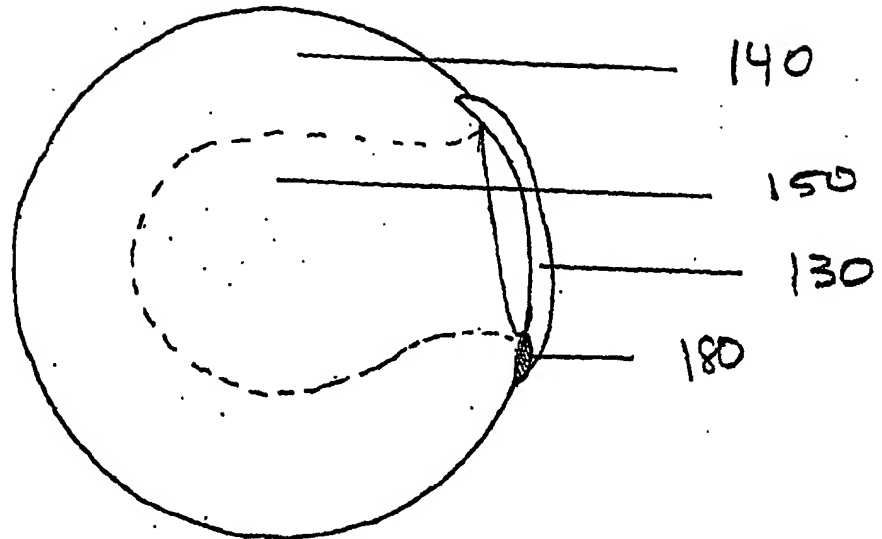
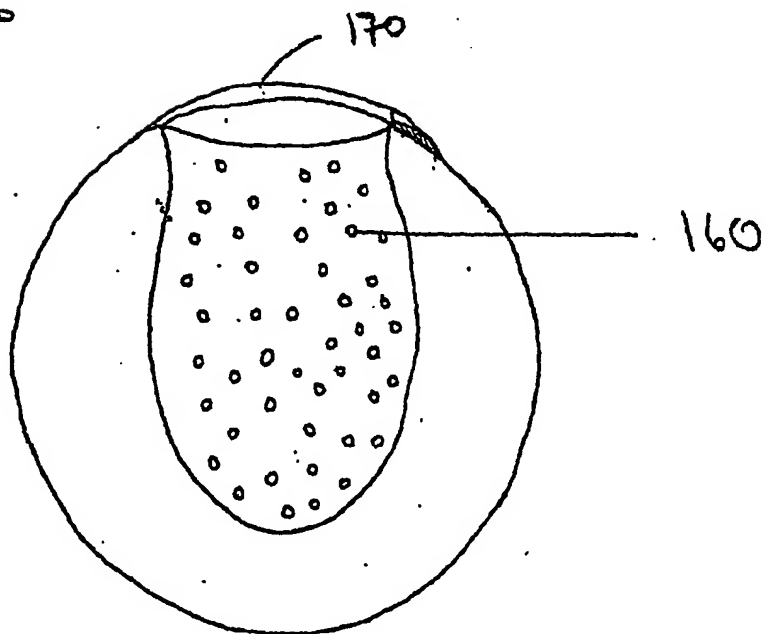


Figure 6b



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